

# FUNCTION NOTATION

## COMMON CORE ALGEBRA II



Functions are fundamental tools that convert inputs, values of the independent variable, to outputs, values of the dependent variable. There is a special notation that is commonly used to show this conversion process. The first exercise will illustrate this notation in the context of formulas.

**Exercise #1:** Evaluate each of the following given the function definitions and input values.

(a)  $f(x) = 5x - 2$

(b)  $g(x) = x^2 + 4$

(c)  $h(x) = 2^x$

$f(3) =$

$g(3) =$

$h(3) =$

$f(-2) =$

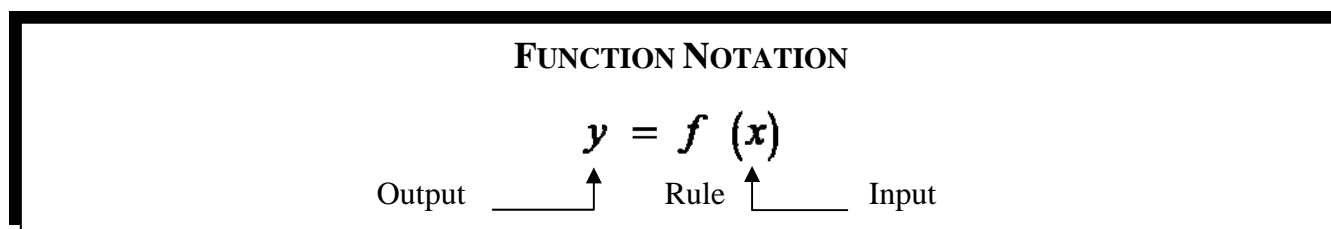
$g(0) =$

$h(-2) =$

$f(x+1)$

$g(a-2)$

Although this notation could be confused with multiplication, the context will make it clear that it is not. The idea of function notation is summarized below.



Recall that function rules commonly come in one of three forms: (1) equations (as in Exercise #1), (2) graphs, and (3) tables. The next few exercises will illustrate function notation with these three forms.

**Exercise #2:** Boiling water at 212 degrees Fahrenheit is left in a room that is at 65 degrees Fahrenheit and begins to cool. Temperature readings are taken each hour and are given in the table below. In this scenario, the temperature,  $T$ , is a function of the number of hours,  $h$ .

$h$ (hours)	0	1	2	3	4	5	6	7	8
$T(h)$ ( $^{\circ}F$ )	212	141	104	85	76	70	68	66	65

(a) Evaluate  $T(2)$  and  $T(6)$ .

(b) For what value of  $h$  is  $T(h) = 76$ ?

(c) Between what two consecutive hours will  $T(h) = 100$ ?



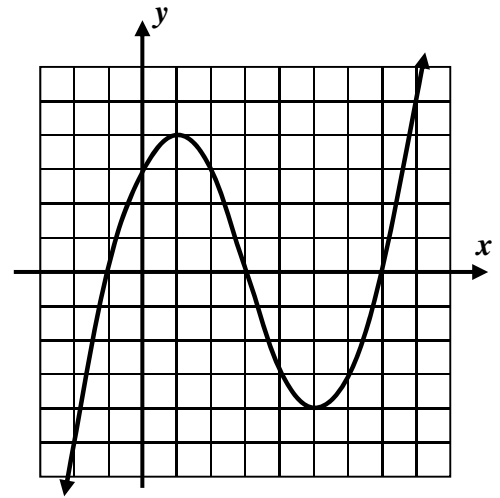
**Exercise #3:** The function  $y = f(x)$  is defined by the graph shown below. Answer the following questions based on this graph.

(a) Evaluate  $f(-1)$ ,  $f(1)$ , and  $f(5)$ .

(b) Evaluate  $f(0)$ . What special feature on a graph does  $f(0)$  always correspond to?

(c) What values of  $x$  solve the equation  $f(x) = 0$ ?  
What special features on a graph does the set of  $x$ -values that solve  $f(x) = 0$  correspond to?

(d) Between what two consecutive integers does the largest solution to  $f(x) = 3$  lie?



**Exercise #4:** For a function  $y = g(x)$  it is known that  $g(-2) = 7$ . Which of the following points must lie on the graph of  $g(x)$ ?

- |               |               |
|---------------|---------------|
| (1) $(7, -2)$ | (3) $(0, 7)$  |
| (2) $(-2, 7)$ | (4) $(-2, 0)$ |

**Exercise #5:** Physics students drop a ball from the top of a 50 foot high building and model its height as a function of time with the equation  $h(t) = 50 - 16t^2$ . Using **TABLES** on your calculator, determine, to the nearest *tenth* of a second, when the ball hits the ground. Provide tabular outputs to support your answer.



# FUNCTION NOTATION

## COMMON CORE ALGEBRA II HOMEWORK

### FLUENCY

1. Without using your calculator, evaluate each of the following given the function definitions and input values.

(a)  $f(x) = 3x + 7$

(b)  $g(x) = 3x^2$

(c)  $h(x) = \sqrt{x-5}$

$f(-4) =$

$g(2) =$

$h(41) =$

$f(2) =$

$g(-3) =$

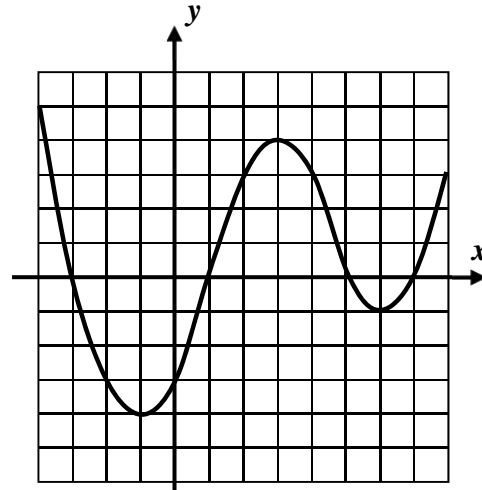
$h(14) =$

$f(x-1) =$

$g(x+3) =$

2. Based on the graph of the function  $y = g(x)$  shown below, answer the following questions.

- (a) Evaluate  $g(-2)$ ,  $g(0)$ ,  $g(3)$  and  $g(7)$ .



- (b) What values of  $x$  solve the equation  $g(x) = 0$

- (c) Graph the horizontal line  $y = 2$  on the grid above and label.

- (d) How many values of  $x$  solve the equation  $g(x) = 2$ ?



## APPLICATIONS

3. Ian invested \$2500 in an investment vehicle that is guaranteed to earn 4% interest compounded yearly. The amount of money,  $A$ , in his account as a function of the number of years,  $t$ , since creating the account is given by the equation  $A(t) = 2500(1.04)^t$ .
- (a) Evaluate  $A(0)$  and  $A(10)$ .
- (b) What do the two values that you found in part (a) represent?
- (c) Using tables on your calculator, determine, to the nearest whole year, the value of  $t$  that solves the equation  $A(t) = 5000$ . Justify your answer with numerical evidence.
- (d) What does the value of  $t$  that you found in part (b) represent about Ian's investment?

